

the Moiero; and, finally, the exploration of the extreme north of the Khatanga and Anabar. A map of the Khatanga and its upper branches shows the important additions to geographical knowledge resulting from the expedition, which has proved that the supposed immense lakes of that district do not exist. In addition, geological information of great interest has been obtained, together with important zoological and ethnographic collections.

PROF. ARISTIDE FIORENTINO, writing in the *Rendiconti* of the Lombardy Academy, directs attention to a school-room experiment for showing the absorption of energy by an acoustic resonator. He places the resonator in the neighbourhood of a singing flame, and if the two are in unison the vibrations of the flame instantly cease. The author has further used the singing flame as a test for syntonised resonance. Thus he has demonstrated in the case of a gramophone horn that those tones are most readily absorbed which are most strongly reinforced. The failure to take account of this fact is no doubt partly the reason why gramophone reproductions usually represent little more than a caricature of the original music. The same records are habitually snorted out through horns of all sizes and shapes, whereas if the free vibrations of any particular horn were reduced by the absorbing action of similar horns in the manufacture of the records, the results would be much better.

Himmel und Erde for March contains the report of a popular lecture on electric transmission of power to great distances, delivered by Prof. H. Görges, of Dresden, before the Scientific Association of Berlin. The lecturer deals in a clear manner with the generation of electric current by the motion of a conductor through a magnetic field, and shows how the modern dynamo is merely an application of this principle. The generation of the power to drive the machines is also treated, special attention being given to the utilisation of the waste gases from blast furnaces and to water power. Prof. Görges believes that the greatest future lies open to the simple alternating as distinguished from the triphase current, and instances the recent installation of the Ohlsdorf-Hamburg-Blankenese electric railway as a step in this direction. The pressure in this case is 6000 volts, with 30,000 for transmission to distant portions of the line.

THE London Geological Field Class excursions, conducted by Prof. H. G. Seeley, F.R.S., for the study of the Thames Basin, will commence on Saturday, May 9. Mr. J. W. Jarvis, St. Mark's College, Chelsea, S.W., is the honorary secretary.

A SECOND edition of the "Guide to the Archives of the Government of the United States in Washington," by Messrs. C. H. V. Tyne and W. G. Leland, has been published by the Carnegie Institution of Washington. The new issue has been revised and enlarged by Mr. W. G. Leland; the usual work of correcting errors, verifying statements, supplementing the bibliographical data, altering classification when required by administrative changes, and bringing the accounts to date, has been performed, and in several cases the text has been much amplified.

OUR ASTRONOMICAL COLUMN.

THE RECENTLY DISCOVERED SATELLITE OF JUPITER.—The observations made at Greenwich of the object near Jupiter, recently discovered by Mr. Melotte, tend to confirm the assumption that this object is in reality a satellite, the eighth of the known Jovian satellites.

In the April number of the *Observatory* (No. 395, p. 177) there appears a note which states that the observed positions, from January 27 to March 23, may be satisfied by

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the assumption that the satellite has a retrograde motion; the pole of the orbit plane lies in R.A. = $334^{\circ} 48'$, N. dec. = $56^{\circ} 44'$; distance from Jupiter 0.24 astronomical unit; daily motion about Jupiter, $0^{\circ}.266$. On February 18 it passed the minor axis of the apparent ellipse. The arc yet observed is so small that any solution can only be tentative, but it is hoped that sufficient observational material has been gathered to ensure the re-discovery of the satellite at the next favourable presentation.

MUTUAL OCCULTATIONS AND ECLIPSES OF JUPITER'S SATELLITES.—A partial occultation of Ganymede by Europa was observed by Mr. Whitmell on January 25, the phenomenon lasting for some fifteen minutes. Prof. Oudemans recently published some ephemerides for occultations to take place in June next, but in No. 395 of the *Observatory* (April, p. 178) there appears a list of times at which occultations will take place during the present month. In the following extract the first Roman figure indicates the eclipsed, the second the eclipsing, satellite:—April 17d. 10h. 41m., II., III.; 17d. 14h. 17m., II., I.; 21d. 12h. 19m., IV., II.; 22d. 9h. 41m., IV., III.; 22d. 11h. 27m., I., II.; 28d. 13h. 29m., IV., III.

THE TRANSIT OF MERCURY, NOVEMBER, 1907.—In No. 4238 of the *Astronomische Nachrichten* (March 9, p. 218) M. Gautier records the results of the observations made, at the Geneva Observatory, of the recent transit of Mercury. Neither the bright outer ring nor the central luminous spot was observed at any time during the transit. Times of the contacts and the positions of Mercury referred to the sun's limb at different times during the transit are given, and it is recorded that M. Pidoux, using the Plantamour equatorial of 271 mm. aperture, found the apparent diameter of the planet's disc to be $8''.4$, an amount sensibly less than that given by the ephemerides.

PARALLAX OBSERVATIONS.—The results of various parallax observations made by Dr. Karl Böhlin at the Stockholm Observatory appear in No. 4240 of the *Astronomische Nachrichten* (March 23, p. 247). The first object considered is a nebula, G.C. 1532, and the second an adjacent star, Lalande 14512. Their respective parallaxes are $-0''.036$ and $-0''.058$, the Brünnow relative corrections for the aberration constant being $+0''.186$ and $+0''.149$ respectively, corrections to which Dr. Böhlin directs especial attention on account of their magnitude. The corresponding figures for Bossert 947 (=Lalande 18115) and 61 Cygni are $+0''.085$ and $+0''.363$ for the parallaxes, and $+0''.102$ and $+0''.048$ for the corrections.

ASTRONOMICAL PHOTOGRAPHY WITH PORTRAIT LENSES.—Some good examples of celestial pictures taken with portrait lenses are reproduced in No. 187, vol. xlv., of the Proceedings of the American Philosophical Society (October-December, 1907, p. 417), in order to illustrate a paper by Prof. Barnard on the subject of astronomical photography. Prof. Barnard, in the first place, discusses the great advantages accruing from photography in the correct delineation of celestial objects, and then points out the special suitability of the earlier portrait lenses of large aperture for this purpose. This is followed by a discussion of each of the objects shown, including nebulae, star clusters, meteor trails, comets, &c. Most of the pictures were taken with the 10-inch Brashear doublet of the Bruce telescope.

THE HARVARD COLLEGE OBSERVATORY.—Prof. Pickering's report of the work done at the Harvard College Observatory during the year ended September 30, 1907, is the sixty-second of its series, and contains the usual brief summary of an immense amount of work. With the 11-inch Draper telescope, 356 photographs were secured, making 17,035 in all, and with the 8-inch Draper telescope the taking of 611 photographs brought the total to 34,886. The spectra of 456 stars, taken with the 11-inch instrument, were studied and classified by Miss Cannon, thus bringing near to completion a catalogue of the spectra of more than 1200 stars north of declination -30° . 2710 stellar photographs were taken at Arequipa, the total numbers now taken with the 13-inch Boyden and 8-inch Bache telescopes being 11,847 and 38,224 respectively. Other results, too numerous to mention here, are contained in the report, and it is announced that to private

individuals a nominal charge will in future be made for the Harvard publications.

THE SATURN PERTURBATIONS OF VARIOUS COMETS.—An abstract (No. 3) from the *Archiv der deutschen Seewarte* (vol. xxx., 1907) contains an important mathematical discussion of the perturbations of several comets by Saturn. The first-order perturbations of comets 1889 V., 1896 VI., and 1903 V. (Brooks) are discussed, and the work has been carried out by Dr. Johannes Wendt.

THE GAMES OF NORTH AMERICAN INDIANS.¹

IT has been known that Mr. Stewart Culin, formerly of the Free Museum of Science and Art in Philadelphia, and now of the Brooklyn Institute Museum, has for many years been engaged in a study of the games of the American Indians, and his monograph on the subject has recently been published in the "Twenty-fourth Annual Report of the Bureau of American Ethnology." The value of the memoir can partly be judged by the fact that, with the full index, it extends to 846 pages and contains 1112 figures in the text, in addition to twenty-one plates. The memoir itself is practically an illustrated catalogue of specimens in various museums, combined with extracts from numerous authors. Students of this interesting and suggestive branch of ethnology have now for the first time a mass of data at their disposal, and it is to be hoped that other regions of the world will be treated by equally qualified investigators in a similarly thorough manner. Some material for such studies occurs scattered in various publications and in unpublished museum specimens, but more field-work is necessary before anything so complete as Mr. Culin's monograph can be accomplished.

The collection has been confined to games in which implements are employed, but Indian children have many amusements played without accessories which belong to a different category from those described by Mr. Culin. It is to be hoped that these will eventually be studied, as they are of equal interest with the others.

The indigenous games of the American Indians, excluding purely children's games, may be divided into two groups:—(1) games of chance; (2) games of dexterity. Games of pure skill and calculation, such as chess, are entirely absent. In the first group are:—(1) games in which implements of the nature of dice are thrown at random to determine a number or numbers, and the sum of the count is kept by means of sticks, pebbles, &c., or upon a counting board; (2) games in which one or more of the players guess in which of two or more places an odd or specially marked lot is concealed, success or failure resulting in the gain or loss of counters. In the second group are:—(1) archery in various modifications; (2) a game of sliding javelins or darts upon the hard ground or ice; (3) a game of shooting at a moving target consisting of a netted wheel or a ring; (4) the game of ball in several highly specialised forms; (5) the racing games, more or less related to and complicated with the ball games. In addition, a few other games are described, and allusion is made to introduced games, such as cards and board games.

References to games are of common occurrence in the origin myths of various North American tribes. They

usually consist of a description of a series of contests, in which the first man or culture hero overcomes some opponent or foe of the human race. The primal gamblers are the Divine Twins, the miraculous offspring of the Sun, who are the principal personages in many Indian mythologies. They, who are the morning and evening stars, live in the east and the west, ruling day and night, summer and winter. Their virgin mother, who also appears as their sister and wife, is constantly spoken of as their grandmother, and is the Moon or the Earth, the Spider Woman, the embodiment of the feminine principle in nature. Always contending, they are the original patrons of play, and their games are the games now played by men. Mr. Cushing thus described the Twins in his account of the Zuñi War Gods:—

"Lo! and of Chance and Fate were they the masters of foredeeming, for they carried the word-painted arrows of destiny, like the regions of men, four in number. And they carried the shuttlecocks of divination, like the regions of men, four in number. And they carried tubes of hidden things . . . and the revealing balls thereof. . . . Yea, and they bore with these other things, the feather bow and plume arrow of far-finding, tipped with the shell of heart-



FIG. 1.—San Carlos Apache Indians playing hoop and pole, Arizona. From a photograph by Mr. S. C. Simms.

searching; and the race sticks of swift journeys and way-winning, two of them, the right and the left, the pursuer and the pursued of men in contention. All these things wherewith to divine men's chance, and play games of hazard, wagering the fate of whole nations on mere pastime, had they with them."

The gaming implements of most North American Indians "are almost exclusively derived from these symbolic weapons." Thus the stick dice are either arrow-shafts or miniature bows, and a similar origin may be asserted for the two or four bones employed in the hand-guessing game or in the four-stick game. Counting sticks in general and the numerous sticks of the widely spread stick game are arrows. The engraved and painted tubes used in the guessing game are arrow shaftments, and this variant probably arose in a country where strong, hollow reeds were used as arrows. In the games of dexterity we also find bows and arrows, often associated with the netted shield. The snow-snake, or game in which missiles are hurled along snow, ice, or frozen ground, appears to be confined to the northern range of tribes within the limit of ice and snow; the projectiles are apparently

¹ "The Games of the North American Indians." By Stewart Culin. Twenty-fourth Annual Report of the Bureau of American Ethnology, 1902-3. Pp. xl+846. (Washington: Government Printing Office, 1907.)